Fig. 8. Lateral outline of caudal tibia, internal. (× 2.) ♀. Berkeley, California.

Fig. 9. Lateral outline of caudal tibia, external. (× 2.) ♀. Berkeley, California.

Stenopelmatus pictus Scudder.

Fig. 10. Head, cephalic aspect. (Natural size.) Type, ♀. San Francisco, California.

Fig. 11. Dorsal view of head and pronotum. (Natural size.) Type, ♀. San Francisco, California.

Fig. 12. Lateral outline of caudal tibia, internal. (× 2.) Type, ♀. San Francisco, California.

Fig. 13. Lateral outline of caudal tibia, external. (× 2.) Type, ♀. San Francisco, California.

Figs. 14 to 16. Dorsal outlines of male supra-anal plate in the genus *Stenopelmatus* to show development of the genital hooks. (Much enlarged.)

Fig. 14. Early instars in which lateral ridges alone are indicated.

Fig. 15. Later instar in which lateral blunt swellings are developed.

Fig. 16. Late instars and adult condition in which fully developed lateral hooks are found.

XANTHŒCIA BUFFALOENSIS GRT., ITS LARVAL HABIT AND OCCURRENCE WITHIN OUR FIFTY-MILE FAUNAL ZONE.

By Henry Bird,

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The keen powers of discernment possessed by the late A. R. Grote have been generally impressed on subsequent students of the Noctuidæ, whenever his species are involved. Though he described a unique example of *Xanthœcia* (*Ochria*) *buffaloensis* many years before (1877), his recollection of details remained clear to him, and after his departure from America to Hildesheim, our correspondence frequently referred to this species for he was fond of this and allied genera. He was wont to remark that once having studied a species, its features were always distinct in his memory, which was born out by his recollection of this moth though he had not seen his type for a decade. His specimen came from Buffalo, N. Y., as indicated by the name. Twenty-two years later one from Chicago, as then only a second example apparently, was re-described by Strecker as *Hydrœcia latia,* the small tubercle on the frons being overlooked by him.

This feature of "*latia*" escaped notice up to 1911[1] when but four specimens were known to us in collections. Last year an occurrence at Elizabeth, N. J. (Mr. O. Buchholz), makes it evident the species is a denizen of our fifty-mile faunal zone. A proper acquaintance however must rest in a knowledge of the larval habit when a sufficiency of material will be available, but our search to this end for many years had been without result. It easily qualified as one of the most elusive Noctuids of our state, so that one exposing the larval habit and foodplant would score an important discovery.

Last season this honor fell to Mr. F. M. Jones at Wilmington, Del., when it transpired the nearly full larval history was observed and a number of moths reared. Very generously this material has been placed at our disposal, and later, at the time of larval maturity, an investigation of the foodplant near Elizabeth, N. J., disclosed the species working there. The young, second stage, boring larva was first met by Mr. Jones and enough difference existed with the Papaipemæ to at once warrant the assumption the new disclosure must be *buffaloensis*. The apprehension of such astute larvæ is due usually to a patient perusal of suspected or assumed suitable, foodplants, and when in the process of elimination *Saururus cernuus* L. was given over to investigation, after several seasons success prevails. The choice of such a water-loving plant, growing as it usually does in standing water, must surely work disaster to the larva at times. This coupled with a severe parasitism which begins at a very early stage, earlier than any of the allies suffer, and with fungi working havoc at maturity and with the pupa, makes us realize very forcibly why the imago is a rare moth. As if to meet an extra hazardous experience this larva is remarkable in several ways. In the point of activity, in changing from one plant to another when the food seems to have no bearing, and in the matter of appetite it is a record-breaking gourmand consuming as it does about twice its bulk daily of the root-stock. When it is recalled some of the *Papaipema* species like *pterisii* and *humuli* eat scarcely more than this amount during the whole larval period of two months, the contrast in this case is pronounced. There is further the power of expelling frass to some distance so that the operations of this larva are not to be confused with any other. How the eggs are placed is unknown, but hibernation

[1] JOUR. N. Y. ENT. SOC., XIX, p. 88.

surely occurs at this period. On June 19 when the larvæ were first encountered, they were well on in the second stage and tunnelling near the top, sometimes entering where the petiole sheath encircled the stem at the second leaf downward. Their presence at this tender portion causes the part above to die and furnishes a ready clue to their position. The borings finally get down to the base though so many changes from one plant to another occur that in no instance under observation did this happen with an individual plant. During the penultimate and last stage every two or three days sees a change. It requires but a few moments for a larva to leave a plant and bore its way in out of sight into another, as they move and operate with a nervous haste quite out of the ordinary with such borers. Entry is a little above the ground level and they work both upward and down into the root, though rather avoiding the latter until quite mature. *Saururus* has a horizontal rootstock which extends a long way for so small a plant and affords a good chance for extended mining. Occasionally a larva will mine 50 cm. in these roots and yet make the long journey back to the ventilating orifice in the stem once in ten to fifteen minutes, for disposing the frass outside. Except for the first work at the top, the plant shows no wilting or browning of the foliage.

Pupation seems normally to occur in the gallery at the root crown or in the root according to Mr. Jones, there being no further enlargement of the orifice. Our experience had to do with diseased larvæ only and these left the plant but imperfectly transformed under a covering of moss. Parasitism in the early stages (two and three), from a small *Ichneumon* as yet undetermined, was very severe. The orifice then made is too small for this wasp to enter and it may pierce the stem with the ovipositor to reach the gallery or host, since a similar species has been observed puncturing the enfolding leaf-roll which sheltered a Pyralid larva, in order to reach its host. Apparently the parasitic larva attains growth in a few days when it spins a white cocoon nearby, and in fifteen days gives up the imago. The host is exceedingly small at this time to support this species and the larval period must needs be brief.

A close relationship to *Papaipema* larva is shown in the species under consideration, even the darkened girdle appearing, though it is not so pronounced. There is little change up to maturity.

Stage III.—Head brown, no side line, ocelli prominent; con-

stricted above the mouth-parts which seem produced; cervical shield darker, shaded at sides; tubercles prominent, blackish, I and II on twelve but slightly larger than the preceding ones; anal and leg plates blackish; body color pale brownish, livid, with a purplish-gray luster; the narrow dorsal and sub-dorsal lines pure white, continuous, or nearly so, the latter being broken into a series of dashes as it crosses joints four, five and six; a broader subspiracular line on two and three, then broken at the girdle, then continued vaguely on the abdominal segments.

Stages IV, V.—Similar.

Penultimate Stage.—Little change, paler; head now more rounded, clypeal suture prominent; tubercles generally larger than the spiracles, on the abdominal segments V is an elongated oval plate larger than the others, VI also being notably defined; on ten IV*a* has not appeared.

Maturity.—Very cylindrical, color and markings lost in a whitish translucence; tubercle now more prominent by contrast, on joint ten IV*a* develops with the examples under observation, the most individual feature being the elongate character of V which is about four times the size of the spiracle, on eleven III and III*a* are separate, whereas they were formerly confluent; anal plates blackish; length 48 mm. Much disparity exists with individuals attaining maturity, early examples finishing the latter days of July, while tardy larvæ may be feeding all through August.

The pupa is very cylindrical, light brown, a protuberance at clypeus projecting at a right angle as aligned with the ventral surface and the frons; the cremaster is a slight thickening of the chitin, flattened ventrally, supporting two small spines, set well apart and somewhat convergent; above these another smaller spine in the same dorsal alignment; length, 22 mm. The pupal period seems about four weeks.

That an unspotted variation of the moth existed with this species, a parallel to what frequently happens with *Papaipema*, was previously known and breeding developments indicate this is quite as prevalent as the type form. In this instance there is less indication of generic position, so well suggested by the white spots, nor is there the prominent anterior crest which is a character for placing the unspotted allies. Superficially this form might easily lead one astray,

indeed Dr. J. B. Smith would never admit it and *buffaloensis* were one and the same species. So it seems wisest to call attention to the facts at this time and to designate the departure with a varietal name.

Xanthœcia buffaloensis simplicissima new variety.

The tubercle on the clypeus and the general color same as type form.

The median area of primaries warm brown with reddish irrorations, the basal and terminal areas washed with purplish; the ante- and postmedial lines are the most prominent marking, double, the inner brown, the outer purplish black as bounding the median field; the median shade line is vague, the subterminal very dentate and sprinkled with a scattering row of reddish golden atoms; the round orbicular and the kidney-shaped reniform but indistinctly outlined in a shade of the darker ground; claviform wanting. Secondaries much paler, of the lighter purple brown and now almost a shade of fawn. Expanse 33–37 mm.

Type locality, Wilmington, Del., F. M. Jones collector; four specimens Aug. 21 to Sept. 30, 1915. A paratype is with Mr. Jones, a male type with the author.

The genitalia are very distinct from the general type in *Papaipema* and possess good individual characteristics, agreeing of course with the type form whose difference only rests in the white spots of the primaries. It has been suggested that Strecker's term *"latia"* be retained for this unspotted form, but such procedure would conflict with the rules, since his type is, and the description personifies that form in which the stigmata are white marked, that which had already been characterized by Grote.

MISCELLANEOUS NOTES.

A Migratory Flight of Dragonflies.—On the afternoon of October 13, 1915, a rather compact swarm of dragonflies was observed in migration at New London, Conn. The swarm came from the north into the Connecticut College grounds and went on southward toward the city. They passed along a hillside overlooking the Thames River and nearly a half mile from the river.